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THE FIRST PRINCIPLES OF AGRICULTURE.

THE above is the title of a neat book of over two hundred pages by Edward B. Voorhees, Professor of Agriculture in Rutgers College and Director of the Experiment Stations of New Jersey. In a clear and attractive manner the important first principles of the crop growers' craft are taken up in logical order. There are fifteen chapters, beginning with the plant constituents and running through the formation of soils, their composition and improvement, and natural and artificial manures. To the latter fully a quarter of the book is devoted, there being a chapter each upon nitrogenous materials, phosphates, superphosphates and potash, salts and methods of buying, etc. Rotation of crops, selection of seed, growth of animals, feeds and fodders, principles of breeding and products of the dairy, complete the list of general subjects treated. To this is added composition and coefficient tables as an appendix, closing with an index.

The author has felt the need of a work like this in his college teaching, and in connection with his work among the farmers themselves. Prof. Voorhees believes that agriculture can be taught in the country schools and "it is here that such education must begin if it is to reach and influence the masses of farmers." With this conviction and the endorsement of the New Jersey Board of Agriculture and State Grange the work has been prepared. It is, however, a book for any farmer, for the contents deal with those general principles that know no State or country. Great stress has been laid upon fertilizers, for Prof. Voorhees, from his especially large experience in this branch of the work, sees that a clear understanding of manures, in the broad sense, and their rational use, lie at the bottom of all future successful agriculture in this country.

BYRON D. HALSTED.

CURRENT NOTES ON PHYSIOGRAPHY.

THE ECONOMIC IMPORTANCE OF PENEPLAINS.

THE relation of geological deposits that have economic value to physiographic conditions, ancient and modern, has often been illustrated. Coal beds record ancient lowlands with extensive marshes of imperfect drainage. In Pennsylvania the preservation of the coal now remaining is due to its having lain all through Mesozoic time out of reach of the weather, that is, beneath baselevel; for practically all the coal there is below the level of the Cretaceous peneplain of that region. Again, the limonite iron ores of the Appalachian valley are products of leaching on surfaces of low grade, the floors of Tertiary valley lowlands, now uplifted and more or less dissected. A recent essay by Hayes (16th Ann. Rep., U. S. G. S.) shows that the Georgia and Alabama pocket deposits of bauxite, the oxide of aluminum and an important source of this metal, are limited to the Tertiary lowland of the Coosa valley; thus again exemplifying the same general principle. The source of the deposits is thought to be in the underlying Cambrian shales; the faults of the regions afford paths for upward transportation; and the low grade of the former valley lowland promoted local accumulation in pockets. Similar deposits may have been formed on the more ancient Cretaceous peneplain of the region; but these have vanished with the uplift and great dissection of that lowland. Similar deposits may in future be formed when the narrow valley trenches of to-day shall have widened into broad floors. But at present the bauxite pockets are practically limited to the unconsumed portions of the Tertiary valley lowland. Hence they stand at altitudes of about 850 feet, although ranging across the bevelled edges of several thousand feet of strata. As a guide in searching for new localities, this generalization is of manifest value.

DETRITAL SLOPES IN ARID REGIONS.

AN excursion into eastern California, inland from the Sierra Nevada and north of the Mohave desert, is described by H. W. Fairbanks in the *American Geologist* for February. The chief mountain ranges are held to be uplifted blocks, little dissected; the form that they had before uplift does not appear to have been considered. The long slopes of coarse detritus reaching forward from the mountain flanks into the desert valleys, constitute characteristic features of the region, as has been pointed out by various observers. Alluvial fans occur with a radius of from six to twelve or fifteen miles. Laterally confluent fans form nearly uniform slopes. A granite ridge south of El Paso range is almost buried in its own waste; the long marginal slopes of gravel and boulders extend headwards into the shallow cañons and reach almost to the ridge summits. Viewed from a distance of ten miles, but little of the granite appears to project above the gravel slopes.

Following a use of terms that needs reform, Fairbanks mentions this ridge as an excellent example of baselevelling. But is it not manifest that, even when the heads of the granite mountains are worn down still lower, the general surface of the detrital slopes will continue to suffer slow degradation for a long time; and furthermore, if the climate of the district had been rainy, is it not true that the existing slopes would not have been assumed. The graded form that the region has almost reached is a function of time and climate as well as of altitude with respect to baselevel. These important topographic controls are neglected if the region is said to be baselevelled.

THE ICE FALL ON THE GEMMI PASS.

THE ice fall from near the summit of the Altels peak, southeast of the Gemmi pass, on September 11th, last, is now fully mapped,

figured and described by Heim in a most interesting report made to the Swiss glacier commission (*Die Gletscherlawine an der Altels, Zurich Naturf. Gesellsch. Neujahrsbl.* 1896.) About four and a half million cubic meters of ice slid down an incline some four kilometers long, descending from 3,200 to 1,900 meters above sea level. Gathering about a million cubic meters of rock waste on the way, the gliding mass ran across the valley floor, dashing far up the opposite slope and falling back again, like a wave from a cliff. Finally settling, the debris occupied a square kilometer of surface to an average depth of five meters. A bench on the path of the sliding ice two hundred meters above the valley caused it to spring forward, like a boy's sled passing a 'hump' in his coast, for a time clear from the ground; then falling, the air beneath it was violently driven out to either side, bearing fragments of ice and stones and overturning trees for several hundred meters laterally and forwards, and thus nearly doubling the area afflicted. As in all Heim's work, the pictures gain great value from being drawn and lithographed by his own hand. One of the photographs represents the genial Zurich professor standing on the ice conglomerate.

INTERGLACIAL VALLEYS IN FRANCE.

MARCELLIN BOULE has recently made an interesting communication to the French Academy on the older and younger—pliocene and quaternary—glaciation of Auvergne (*Comptes Rendus*, December 2, 1895), from which it appears that the valleys of the elevated plateau of central France were excavated during a nonglacial interval. The upland bears extensive deposits of morainic material with scratched stones of all sizes and numerous *roches moutonnées*, implying an extensive glaciation. Beneath this upland, valleys are trenched to a depth, two, or even three hun-

dred meters. In the valleys lie the moraines of local glaciers, to which reference has frequently been made by various observers.

MISCELLANEOUS.

Appalachia for January contains well illustrated narratives of ascents in the Canadian and Montana Rockies, and the California Sierra. The photographs by the Topographical Survey of Canada exhibit the great extent of lofty mountainous country in which deep valleys are dissected.

THE *National Geographic Magazine* (now issued monthly) for January, February and March contains descriptive articles on Russia by G. G. Hubbard, Venezuela by W. E. Curtis, Arctic exploration by S. Jackson, A. W. Greely and W. H. Dall, the Panama and Nicaragua canals by R. T. Hill and A. W. Greely, Tehuantepec ship railway by E. W. Corthell, the submarine cables of the world by G. Herrle, and the survey of Indian Territory by H. Gannett. Geographic literature and notes are briefly treated in each number.

AN abstract of explorations by Obruchef in central Asia is given in the *Scottish Geographical Magazine* for February. It emphasizes the mountainous character of much of the desert of Gobi, which was treated as a plain in older descriptions. "A marked peculiarity of many chains in central Asia is that they stand on high broad pedestals insensibly sloping down to the low central parts of the depressions." This is probably an incorrect interpretation of ranges nearly buried in alluvial wash.

THE same journal for March gives a sketch of British Guiana, by Chalmers, briefly characterizing the coastal plain, the inner highlands and their mountains, and the falls of the rivers in their descent from the higher to the lower district. Roraima and Kaitum are outlined.

VAUGHAN's journeys in Persia are nar-

rated in the London *Geographical Journal* for January and February. Special account is given of the Dasht-i-Kavir, or Great Salt desert, 360 miles east-west by 150 north-south, with a central depression one or two thousand feet below its margin, and including a great salt bed 440 square miles in area.

THE same journal for February has a paper on the Japanese Alps by W. Weston, speaking highly of their picturesque scenery. They consist of a backbone of granitic rocks, through or over which vast quantities of volcanic rocks have been poured.

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SCIENTIFIC NOTES AND NEWS.

MR. WILLIAM I. HORNADAY, formerly of the National Museum, has been appointed Director of the proposed Zoölogical Park in New York. He is eminently qualified for the position by his extensive knowledge of zoölogy, his ability as an untechnical writer upon travel and natural history, and especially by his experience in connection with the establishment of the National Zoölogical Park at Washington. He enters upon his duties immediately and will first consider and report to the Executive Committee upon the difficult question of location of the Park. At the last meeting of the Society the three first honorary members were elected as follows: Sir William H. Flower, Director of the British Museum of Natural History, President of the London Zoölogical Society; Prof. Alexander Agassiz, of the Museum of Comparative Zoölogy, and Prof. J. A. Allen, of the American Museum of Natural History.

THE first session of the Bahama Biological Station under the direction of Prof. Charles L. Edwards, University of Cincinnati, was held during the summer of 1893, at Bimini Islands, Bahamas. For the coming season it has been decided to locate the laboratory at Biscayne Bay, Florida, in the latitude of the Bimini Islands, and just across the Gulf Stream. Here is found the same equable climate, clear water and sub-tropical fauna and flora, for which the Bahamas are famous. An all-rail route of two